

Remarks

The present application was filed November 20, 2000 with original claims 1-20. The Office Action (Paper No. 5) mailed January 14, 2004 rejected all the claims.

The Applicant has provided certain amendments to more particularly point out and distinctly claim the patentable subject matter of the present invention. These amendments are proper, do not introduce new matter, do not narrow the scope of the claimed subject matter in face of a prior art rejection, and place the application in proper condition for reconsideration.

Claim Objections

Claims 7 and 10 were objected to for informalities associated with inconsistent references in steps (g), (h), and (i) in claim 7, and in step (g) in claim 10. Claim 7 and 10 have been amended herein to delete these step references, thus obviating the objection. Withdrawal of the rejection is respectfully requested.

Rejection of Claims Under 35 U.S.C. §112, Second Paragraph

Claims 1 and 4 were rejected for indefiniteness as follows:

In claim 1 “the association” should be “an association.” The Applicant has deleted the language “the association” to obviate this rejection.

In claim 1 “the manufacture” should be “a manufacture.” The Applicant has deleted the language “the manufacture” to obviate this rejection.

In claim 4 “the group” should be changed to “a group.” The Applicant has changed the language to read “a group” in both claim 4 and claim 13.

Accordingly, reconsideration and withdrawal of the present rejection of claims 1 and 4 are respectfully requested.

Rejection of Claims Under 35 U.S.C. §102(e)

Claims 1-7, 9-14, and 16-19 were rejected as being obvious over Matsui ‘545 in view of Abe ‘498 and further in view of Hopkins ‘765.

Claim 1

Claim 1 was rejected over Matsui '545 in view of Abe '498. The Applicant has amended claim 1 to more particularly point out and distinctly claim the patentable subject matter of the present invention.

Claim 1 as amended recites novel and nonobvious features “*determining a printed circuit board assembly identification associating the use of the selected component with the selected printed circuit board for subsequently tracking the selected component.*” The “*printed circuit board assembly identification*” comprises a circuit board unique identification, such as a serial number, in combination with a component identification associated with an original equipment manufacturer’s source identification for the component, such as a supplier’s lot number. By associating the printed circuit board and the component identifications into the printed circuit board assembly identification, individual components can be tracked through the production process. The present invention, as claimed in claim 1, solves the prior art problem typified by the cited references wherein an assembly identified as having a defective component cannot precisely identify all the other assemblies that are likely defective for the same reason. The embodiments of the present invention provide novel solutions for better pinpointing where potential quality problems may lie within work-in-process and/or finished goods.

Matsui '545 is silent regarding retaining an original equipment manufacturer’s (“OEM”) source identifier for a component as a constituent in an assembly identification for the assembly into which the component is installed. Rather, in Matsui '545, the component parts lose their identity with respect to the OEM source identifier upon successfully completing the acceptance test. That is, in Matsui '545 once the individual components are approved for use, the system there manages not the individual parts but rather “structural parts lists.” (Matsui '545, col. 9 line 66 – col. 10 line 1). The structural parts list, one each of all the components needed to build a printed circuit board assembly, and that have been individually accepted (e.g. bill of material), is given a “parts number” (as opposed to tracking individual part numbers).

For example, after acceptance Matsui '545 groups accepted parts according to the structural parts list, and according to this grouping process, assigns a manufacturer’s parts name (not part names) and lot code (not lot codes). Importantly, the manufacturer’s parts name and lot code do not retain the OEM component source identifiers. For example, Matsui '545 discloses:

A tracking process carried out by the second embodiment of the present invention will now be described with reference to FIG. 19. A parts acceptance process 336 is carried out, and data generated during the parts acceptance process 336 is stored in the data file 225 and then transferred to a tracking process part 210 implemented by the CPU 114. The above data shows the name of the accepted parts, a lot code, the number of the accepted parts [sic].
(Matsui '545, col. 11 lines 5-13, emphasis added)

In its description of the process for investigating a field failure, Matsui '545 describes the input search criteria, apparently obtained from markings on the failed unit, as having a parts code (parts name) as "IC11" and a lot code as "901A00." (Matsui '545, col. 12 lines 24-27). In that investigating procedure, the parts name and lot code have been previously identified with an "acceptance number" which is stored in database 225:

At step 141, the acceptance number of the parts being considered is searched for in the data file 225. FIG. 22(A) shows an example of parts acceptance data stored in the data file 225. As shown, the parts acceptance data shows the parts name, the accepted date, the number of accepted parts, the acceptance number and the lot code. In the parts acceptance data shown in FIG. 22(a) shows [sic] that the acceptance number is "PA01."
(Matsui '545, col. 12 lines 28-36)

The acceptance number is then used in Matsui '545 in order to determine what assembly run the suspect parts were used in:

By referring to the data file 226 shown in FIG. 19, step 142 checks the relationship between the acceptance number of the parts of interest and the assembly number with which the parts were delivered....It can be seen from FIG. 22(B) that the assembly number having acceptance number "PA01" is "NG00001NA."
(Matsui '545, col. 12 lines 37-48)

Matsui '545 continues on from the assembly number to determine the drawing number, the edition, the manufacturing date, the manufacturing serial number, and the shelf number in order to ascertain where other circuit board assemblies exist that are likely to have the same problem as was identified by the field failure. A distinct disadvantage to this process in Matsui '545, however, is the underlying assumption that the "acceptance number" adequately isolates potential OEM supplier quality problems.

For instance, suppose an OEM produces a particular lot run that is defective, but which defect is not adequately screened for in the manufacturer's acceptance process. Only in the case when all the OEM's defective components, as identified by the OEM's lot run, are received and accepted by the manufacturer at the same time will the product management process of Matsui '545 effectively identify the other circuit board assemblies that likely have the same defect. That is, if some of the OEM's defective lot run is received one month, and another portion of the OEM's defective lot run is received another month, then under Matsui '545 the two batches of defective components will be associated with two different acceptance numbers. Therefore, a field failure identifying the first acceptance number will not trigger an investigation of circuit board assemblies containing parts bearing the second acceptance number. Obviously, the two-month delivery span is an arbitrary example, the acceptance number is more likely associated with the manufacturer's batch processing cycle of received goods for acceptance, and that could well occur more than once in a given day.

Claim 1 has been amended to more particularly point out and distinctly claim the patentable subject matter of the present invention comprising a computerized method of "*capturing a component identification.*" Support for this amendment is found in the Specification at least in the method step 420 of FIG. 4, method step 510 of FIG. 5, item 670 of FIG. 6, item 790 of FIG. 7, and items 865, 870 of FIG. 8. For example, without limitation, the Specification sets forth:

The method also includes receiving an indication of a failed component of the first PCBA 420. The failed component is a member of a group or plurality of substantially similar components that were used in the manufacture of a group of printed circuit board assemblies. In one example, the plurality of substantially similar components includes a reel and/or tray of component.

(Specification, pg. 10 line 22-26.)

The method includes the step of capturing an ID of the group of substantially similar components 510. In one example, the capturing step includes scanning. In another example, the group of substantially similar components is a reel and/or tray of components with a bar-code label. In a further example, the capturing step 510 includes scanning a bar-code label on a reel and/or tray of components. In yet another example, the ID of the group of substantially similar components includes a trace code, a lot code, and a vendor of the group of substantially similar components; a

production date, a date after which the PCBA ID is produced, and a date before which the PCBA ID is produced.

(Specification, pg. 11 line 26 – pg. 12 line 4)

Each reel and/or tray 630 has a bar coded label that uniquely identifies the reel and/or tray. The production line 600 includes a line client 660, operably coupled to an identification capturer 670, such as a hand-held bar-code scanner 670. The identification, such as a bar-code, of substantially similar components, such as a reel and /or tray of components, is captured by the identification capturer 670 and communicated to the line client 660.

(Specification, pg. 12 line 28 – pg. 13 line 5)

The bar-coded identification code 770 on each of the plurality of printed circuit board assemblies 740 is scanned and stored in the storage device 720 by capturer 790.

(Specification, pg. 14 lines 7-9)

In conclusion, systems and methods are disclosed through which printed circuit board assemblies (PCBAs) that share components that have a high rate of failure are identified. The components are substantially similar components, such as components that are embodied on a reel and/or tray and/or components that were manufactured by the same manufacturer. The identification (ID) of substantially similar components are captured, such as by scanning a barcode ID of the substantially similar components, and the ID of each PCBA is captured, such as by scanning a barcode ID of each PCBA.

(Specification, pg. 17 lines 8-14)

Claim 1 has also been amended to more particularly point out and distinctly claim the patentable subject matter of the present invention comprising a computerized method of “*determining a printed circuit board assembly identification associating the use of the selected component with the selected printed circuit board.*” Support for this amendment is found in the Specification at least in the method step 440 of FIG. 4, method step 530 of FIG. 5, item 680 of FIG. 6, item 760 of FIG. 7, and items 865, 870 of FIG. 8. For example, without limitation, the Specification sets forth:

In one example, the determining step includes determining a group of unique IDs of the members of a group of PCBAs, other than the failed PCBA, that include a failed

production date, a date after which the PCBA ID is produced, and a date before which the PCBA ID is produced.

(Specification, pg. 11 line 26 – pg. 12 line 4)

Each reel and/or tray 630 has a bar coded label that uniquely identifies the reel and/or tray. The production line 600 includes a line client 660, operably coupled to an identification capturer 670, such as a hand-held bar-code scanner 670. The identification, such as a bar-code, of substantially similar components, such as a reel and /or tray of components, is captured by the identification capturer 670 and communicated to the line client 660.

(Specification, pg. 12 line 28 – pg. 13 line 5)

The bar-coded identification code 770 on each of the plurality of printed circuit board assemblies 740 is scanned and stored in the storage device 720 by capturer 790.

(Specification, pg. 14 lines 7-9)

In conclusion, systems and methods are disclosed through which printed circuit board assemblies (PCBAs) that share components that have a high rate of failure are identified. The components are substantially similar components, such as components that are embodied on a reel and/or tray and/or components that were manufactured by the same manufacturer. The identification (ID) of substantially similar components are captured, such as by scanning a barcode ID of the substantially similar components, and the ID of each PCBA is captured, such as by scanning a barcode ID of each PCBA.

(Specification, pg. 17 lines 8-14)

Claim 1 has also been amended to more particularly point out and distinctly claim the patentable subject matter of the present invention comprising a computerized method of “*determining a printed circuit board assembly identification associating the use of the selected component with the selected printed circuit board.*” Support for this amendment is found in the Specification at least in the method step 440 of FIG. 4, method step 530 of FIG. 5, item 680 of FIG. 6, item 760 of FIG. 7, and items 865, 870 of FIG. 8. For example, without limitation, the Specification sets forth:

In one example, the determining step includes determining a group of unique IDs of the members of a group of PCBAs, other than the failed BCBA, that include a failed

component of the group of substantially similar components.

(Specification, pg. 11 lines 5-8)

Then, the ID of the group of substantially similar components is associated with the first unique ID of the first PCBA 530.

(Specification, pg. 12 lines 7-8)

The server 680 records the identification of each PCBA 140 during production and the identification of each group of substantially similar components. The server 680 performs method 400 of FIG. 4 and/or the associating step of 550 of method 500 of FIG. 5.

(Specification, pg. 13 lines 18-21)

The software means includes a determiner 760 that determines printed circuit boards that are associated to each other. The association is determined from a bar-coded identification code 770, such as a bar code label, on each of the plurality of printed circuit board assemblies 740 and from the bar-coded identification code 780 on the group of substantially similar components embodied on the reel and/or tray 750.

(Specification, pg. 14 lines 3-7)

Later, an association between the ID of each PCBA and the ID of substantially similar components is determined.

(Specification, pg. 17 lines 15-16)

Claim 1 has also been amended to more particularly point out and distinctly claim the patentable subject matter of the present invention comprising a computerized method of *“identifying the selected printed circuit board from the determining step (d) in response to another circuit board comprising a component from the plurality of components and indicating a possible component failure.”* Support for this amendment is found in the Specification which at least sets forth:

More specifically, the system 300 enables PCBAs that have components that share a substantial similarity to identified, and the identification to be communicated to interested entities. Identifying the PCBAs is particularly useful when performing recalls of PCBAs that have a high probability of failure.

(Specification, pg. 11 lines 18-21)

The method also includes capturing the second unique ID of the second PCBA 540 and associating the ID of the

group of substantially similar components with the second unique ID of the second PCBA 550.
(Specification, pg. 12 lines 8-11)

Apparatus 800 also includes a determiner 835 of another unique bar-coded ID number 840 of a second PCBA. The second PCBA includes a failed component of, or from, the plurality of substantially similar components. The determiner 835 cross-references the indication of a failure 815 and the PCBA ID 820, the indication of a failed PCBA component 830, and a database (DB) 842 of manufactured PCBAs. The manufactured PCBA database (DB) 842 stores information including the ID of PCBAs and the ID of the plurality of substantially similar components that were used in the manufacture of the PCBAs.
(Specification, pg. 15 lines 1-12)

PCBAs that share components that have a high rate of failure are identified from the association. The association is used to identify PCBAs that are at risk for sharing a common failure.
(Specification, pg. 17 lines 16-18)

The references Matsui '545 and Abe '498, taken as a whole, do not disclose or suggest a computerized tracking method employing the "*capturing a component identification*," or "*determining a circuit board assembly identification associating the use of the selected component with the selected printed circuit board*," or "*identifying the selected printed circuit board from the determining step (d) in response to another circuit board comprising a component from the plurality of components and indicating a possible component failure*." As such, these references cannot sustain the Section 103 rejection of claim 1.

In the rejection of claim 7 the Examiner further cited Hopkins '765 as disclosing reading the codes of parts to "allow traceability of the manufacturing process such that each part installed on a given PCB can be tracked." (Office Action of 1/14/2004, pg. 7)

However, Hopkins '765 like Matsui '545 is silent regarding the use of a component identification associated with an OEM's source identifier as part of a printed circuit board assembly identification. Hopkins '765 in fact is wholly silent regarding contemplating a lot identifier, except for one passing reference to the manufacturer's own lot (Hopkins '765, col. 2 lines 41-43); there is no contemplation whatsoever of retaining an OEM source identifier for tracking purposes. In fact, Hopkins '765

explicitly enumerates that the information contemplated for complete traceability does not include an OEM source identifier:

Still referring to FIG. 1, the dogtag reader 37, dogtags 39, fixed bar code scanner 44, docking station 40 and handheld barcode scanner 42 allow complete traceability of the manufacturing process such that each part installed on a given PCB can be traced in terms of a particular machine, reel, device location, time, date, machine operator, and operating condition of the processing machine (e.g., temperature of the reflow oven).
(Hopkins '765, col. 6 lines 38-44)

The motivation to combine and/or modify the cited references to arrive at the present invention must come from factual evidence provided in the rejection. *In re Dembiczak*, 50 USPQ2d 1614 (Fed. Cir. 1999). The Examiner must make a prima facie case of obviousness that states clearly and specifically any factual objections to patentability. *In re Oetiker*, 24 USPQ2d 1443 (Fed. Cir. 1992). Deficiencies in the cited references cannot be remedied by the Examiner's general conclusions about what is basic knowledge or common sense to one skilled in the art. *In re Zurko*, 59 USPQ2d 1693 (Fed. Cir. 2001)

Here, the Examiner's stated motivation for modifying and/or combining the references to arrive at the presently claimed invention, "it would allow the system to track components with PCB's easier and quickly alerting customers of problem components" is not based on facts from the cited references, and otherwise not based on a factual record.

In accordance with the evidentiary provisions of 37 CFR 1.104, and because the rejection appears to be based on the personal knowledge of the Examiner, the Applicant respectfully requests the Examiner to cite a factual reference motivating the modification and/or combination of the references, or else provide an affidavit attesting to the factual basis, if the rejection is maintained.

The cited references, taken as a whole, do not disclose all the recited elements of the present invention as claimed in claim 1. Accordingly, the Section 103 rejection cannot be sustained. Reconsideration and withdrawal of the rejection of claim 1 and the claims depending therefrom are respectfully requested.

Claim 11

Claim 11 was rejected over Matsui '545 in view of Abe '498. The Applicant has amended claim 1 to more particularly point out and distinctly claim the patentable subject matter of the present invention.

Claim 11 as amended recites novel and nonobvious features “*a second capturer of a component identification of a selected component from a plurality of components, the component identification associated with an original equipment manufacturer's source identifier...*,” “*a determiner of a printed circuit board assembly identification associating the use of the selected component with the selected printed circuit board for subsequently tracking the selected component...*,” and “*an identifier of the selected printed circuit board responsive to the determiner and another printed circuit board comprising a component from the plurality of components and indicating a possible component failure.*”

As discussed above, the “*printed circuit board assembly identification*” comprises a unique board identification, such as a serial number, in combination with a component identification associated with an original equipment manufacturer's source identification for the component, such as a supplier's lot number. The *first capturer* captures the circuit board unique identification, and the *second capturer* captures the component identification. Matsui '545 and Abe '498, taken as a whole, do not disclose or suggest these claimed elements and as such cannot sustain the Section 103 rejection of claim 11.

Like claim 7 above, in the rejection of claim 14 the Examiner further cited Hopkins '765 as disclosing reading the codes of parts to “allow traceability of the manufacturing process such that each part installed on a given PCB can be tracked.” (Office Action of 1/14/2004, pg. 7) As discussed above, Hopkins '765 does not disclose the recited claim elements, and does not provide motivation for modifying and/or combining the references to arrive at the claimed invention. Here, the Examiner's stated motivation for modifying and/or combining the references to arrive at the presently claimed invention, “it would allow the system to track components with PCB's easier and quickly alerting customers of problem components” is not based on facts from the cited references, and otherwise not based on a factual record.

In accordance with the evidentiary provisions of 37 CFR 1.104, and because the rejection appears to be based on the personal knowledge of the Examiner, the Applicant respectfully requests the Examiner to cite a factual reference motivating the modification and/or combination of the references, or else provide an affidavit attesting to the factual basis, if the rejection is maintained.

The cited references, taken as a whole, do not disclose or suggest all the recited elements of the present invention as claimed in claim 11. Accordingly, the Section 103 rejection cannot be sustained. Reconsideration and withdrawal of the rejection of claim 11 and the claims depending therefrom are respectfully requested.

Claim 20

Claim 20 was rejected as being obvious over Matsui '545 in view of Hopkins '765. However, the cited references do not, taken as a whole, disclose or suggest the cited feature "*means for determining a printed circuit board assembly identification...*" Claim 20 is written in accordance with 35 U.S.C. §112, sixth paragraph. The Applicant has identified the recited "means" element to cover at least the capturer 670, 790, 865, and 870 and the determiner 680, 760, 875, and 880. This structure accounts for capturing the component identification associated with an OEM's source identifier, capturing a unique circuit board identification number, and associating the component and the circuit board in determining the printed circuit board assembly identification for the combination for using in tracking the component during production.

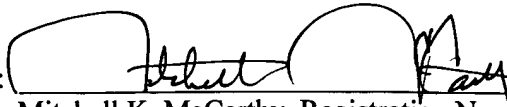
The Examiner is obliged as a matter of law to construe this means element as this structure, and equivalents thereof. See *B. Braun Medical, Inc. v. Abbott Lab.*, 43 USPQ2d 1896, 1900 (Fed. Cir. 1997); *In re Donaldson Co. Inc.*, 26 USPQ2d 1845 (Fed. Cir. 1994)(*en banc*); *In re Dossel*, 42 USPQ2d 1881 (Fed. Cir. 1997); *Supplemental Examination Guidelines for Determining the Applicability of 35 U.S.C. 112, Para. 6*, 65 FR 38510. Failure to do so constitutes reversible error.

When this means element is properly construed, it is clear that the cited references, taken as a whole, fail to disclose this element, for the reasons discussed above. Accordingly, the cited references cannot sustain the Section 103 rejection. The Applicant respectfully requests reconsideration and withdrawal of the rejection of claim 20.

Conclusion

This is a complete response to the Office Action mailed January 14, 2004. The Applicant respectfully requests that the Examiner enter the above amendments, reconsider the application and allow all of the pending claims. The Examiner is invited to contact the below signed Attorney should any questions arise concerning this response.

Respectfully submitted,

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